REMARKS

The enclosed is responsive to the Final Office Action mailed on May 12, 2010. At the time the Examiner mailed the Office Action claims 1, 2, 14-21 and 23 were pending. By way of the present response Applicant has amended no claims, no claims have been canceled, and no new claims have been added. As such, claims 1, 2, 14-21 and 23 are now pending. Applicant respectfully requests reconsideration of the present application and the allowance of all claims now presented.

Claim Rejections - 35 U.S.C. § 103

Claims 1-2, 9-14, 16-19, and 23

The Examiner has rejected claims 1-2, 9-14, 16-19, and 23 under 35 U.S.C. § 103(a) as being unpatentable over *Gorczyca et al.* (U.S. Publication No. 2002/0094686 A1) in view of *Boggs* (U.S. Patent No. 6,087,191) and *Lynch et al.* (U.S. Patent No. 4,656,730). Specifically, the Examiner states on page 3 of the Office Action that "it would have been well within the level of ordinary skill in the art at the time of the invention to apply zirconium oxide in Gorczyca in lieu of silicon oxide depending on the composition of the substrate being repaired since Boggs teaches their equivalence and Lynch explains the importance of repairing such a substrate with a material which has a similar thermal expansion coefficient" (emphasis by Applicant). Applicant respectfully disagrees and submits that one of ordinary skill in the art would not have combined *Gorczyca et al.* with *Boggs* and *Lynch et al.* It would be impermissible hindsight, based upon Applicant's own disclosure, to combine *Gorczyca et al.* with *Boggs* and *Lynch et al.*

Gorczyca et al. discloses a process of mechanically roughening a quartz article surface to create micro cracks, followed by chemically etching the micro cracks in the quartz surface in order to open up or round out the micro cracks, leaving the quartz surface with trenches that replace the micro cracks. The shape of the trenches prevents further propagation into the quartz bulk when surface stress is applied to the quartz article during LPCVD coating

processes. See paragraph [0022]. In particular, *Gorczyca et al.* is concerned with stresses which result from the application of silicon films on the quartz surfaces. See paragraph [0036]. *Gorczyca et al.* describes at paragraph [0023] that a silicon film can be applied which partially fills the trenches. The silicon film can then be converted to silicon oxide which expands in volume to completely fill the trench. The single sentence paragraph [0023] is the only part of the description of *Gorczyca et al.* which discloses applying and oxidizing a silicon film to expand and fill the trench. *Gorczyca et al.* does not disclose how, when or why the silicon film is applied and oxidized.

Boggs discloses a method for repairing scratches, divots, pinholes, etc. formed in a substrate during a polishing operation. *Boggs* provides list of materials, including silicon oxide and zirconium oxide, as being dissolvable in a hydrothermal environment so that they can be deposited into the scratches, divots, pinholes, etc. as a fill material in order to form a smooth, defect-free surface. As described at col. 2, lines 33-44, under the specific conditions of *Boggs*, the materials preferentially migrate to the areas of high surface area (i.e. scratches, divots, pinholes, etc.).

The Examiner suggests on page 3 of the Office Action to "apply zirconium oxide in Gorczyca in lieu of silicon oxide depending on the composition of the substrate being repaired since Boggs teaches their equivalence". Thus, the Examiner suggests not only to replace the LPCVD chamber quartz articles with zirconium oxide articles, but to also deposit zirconium oxide (which is performed through a hydrothermal environment) into the trenches formed in the modified article. Applicant respectfully submits that one of ordinary skill in the art would not have been proposed to make the modification as proposed by the Examiner.

Firstly, the proposed combination presupposes that quartz articles (e.g. liner, process tube, shield, baffle, paddle, cantilever arm, boat) are interchangeable with zirconium oxide articles within a LPCVD chamber. Secondly, the proposed combination presupposes that the

hydrothermal deposition of zirconium oxide onto the roughened surface of the article is compatible with the purpose of *Gorczyca et al.* to form a roughened surface that LPCVD deposited silicon films will firmly adhere to and not flake off or delaminate from during extended use in an LPCVD furnace. See paragraph [0034]. However, the hydrothermal deposition technique of *Boggs* which deposits at high energy locations is used to provide a smooth, defect-free surface. Thus, the proposed combination would have the effect of smoothing the roughened surface of *Gorczyca et al.* thereby compromising the intended purpose of *Gorczyca et al.*

Accordingly, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to apply a zirconium oxide film as described in *Boggs* onto the roughened article of *Gorczyca et al.*

Lynch et al. discloses the formation of a trench isolation 80 which serves to prevent or reduce lateral diffusion of dopants where not desired. As described at col. 3, lines 25-26 the trench isolation 80 is formed using conventional lithographic and etching techniques. In order to prevent crack-inducing voids, the trench 80 sidewall angle should be greater than or equal to about 5 degrees. Trench 80 is filled with a fill material 100 which preferably has a thermal expansion which is not substantially different than that of the substrate 10, to avoid cracks which can develop during the high temperature diffusion processes involved in fabricating the source and drain regions of the FETs.

The Examiner states on page 2 of the Office Action that "Lynch teaches that, when filling cracks in a substrate which will be exposed to high temperature processes, it is necessary to ensure that the trenches are filled with a material which has a similar thermal expansion coefficient to the substrate in order to avoid cracking during subsequent usage (4:66-5:4). Applicant respectfully submits that *Lynch et al.* does not stand for such a general proposition. Firstly, *Lynch et al.* does not disclose or suggest filling cracks in a substrate. To

the contrary, *Lynch et al.* discloses filling trenches specially prepared by lithographic techniques to have controlled dimensions including the sidewall angles. Secondly, *Lynch et al.* discloses that it is preferable that materials 100/10 do not have substantially different thermal expansions to avoid cracks which can develop during the high temperature diffusion processes involved in fabricating the source and drain regions of the FETs. FETs and source/drain regions are not fabricated in the quartz articles adjacent to the trenches of *Gorczyca et al.*

For at least these reasons, it is respectfully submitted that one of ordinary skill in the art would not have looked to the particular processes of *Lynch et al.* and *Boggs* to modify the process of *Gorczyca et al.* It would be impermissible hindsight, based upon Applicant's own disclosure, to combine *Gorczyca et al.* with *Boggs* and *Lynch et al.* Therefore, Applicant respectfully submits that the invention claimed in claims 1-2, 9-14, 16-19, and 23 is not obviated by the disclosures of *Gorczyca et al.* in view of *Boggs* and Applicant respectfully requests the withdrawal of the rejections of the claims under 35 U.S.C. § 103(a).

Claims 4 and 15

The Examiner has rejected claims 4 and 15 under 35 U.S.C. § 103(a) as being unpatentable over *Gorczyca et al.*, *Lynch et al.* and *Boggs* as applied to claim 1, in view of *Choi* (U.S. Patent No. 6,833,279 B2).

The Examiner relies upon *Choi* as disclosing an alumina or yttrium oxide layer. It is respectfully submitted that *Choi* does not remedy the deficiencies of the proposed modification of *Gorczyca et al.* in view of *Boggs* and *Lynch et al.* discussed above. Therefore, Applicant respectfully submits that the invention claimed in claims 4 and 15 is not obviated by the disclosures of *Gorczyca et al., Lynch et al.* and *Boggs* in view of *Choi*, and Applicant respectfully requests the withdrawal of the rejections of the claims under 35 U.S.C. § 103(a).

Claims 5-8, 20, and 21

The Examiner has rejected claims 5-8, 20, and 21 under 35 U.S.C. § 103(a) as being unpatentable over *Gorczyca et al., Lynch et al.* and *Boggs* as applied to claim 1, and further in view of *Kowalsky et al.* (U.S. Patent No. 6,861,101 B1) and *Choi.*

It is Applicant's understanding that *Kowalsky et al.* discloses a plasma spray method. Applicant respectfully submits that *Kowalsky et al.* and *Choi.* do not remedy the deficiencies of the proposed modification of *Gorczyca et al.* in view of *Lynch et al.* and *Boggs* as discussed above. Therefore, Applicant respectfully submits that the invention claimed in claims 5-8, 20, and 21 is not obviated by the disclosures of *Gorczyca et al., Lynch et al.* and *Boggs* in view of *Kowalsky et al.* and *Choi*, and Applicant respectfully requests the withdrawal of the rejections of the claims under 35 U.S.C. § 103(a).

Pursuant to 37 C.F.R. § 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. §§ 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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